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PLANETARY PHENOMENA FOR NOVEMBER  
AND DECEMBER, 1919  
By MALCOLM McNEILL

PHASES OF THE MOON, PACIFIC TIME

Full Moon.....Nov. 7, 3 <sup>h</sup> 35 <sup>m</sup> P.M.	Full Moon.....Dec. 7, 2 <sup>h</sup> 3 <sup>m</sup> A.M.
Last Quarter..... " 14, 7 40 A.M.	Last Quarter.... " 13, 10 2 P.M.
New Moon..... " 22, 7 20 A.M.	New Moon..... " 22, 2 55 A.M.
First Quarter.... " 30, 8 47 A.M.	First Quarter.... " 29, 9 25 P.M.

The second eclipse of the year is a *Partial Eclipse of the Moon* on November 7th. The beginning is visible in Europe, Africa, the eastern part of North America and South America except the extreme western part; the ending is visible generally in Europe, Africa, South America, and North America except the extreme western part. The magnitude of the eclipse is small, less than one-fifth of the Moon's diameter being obscured when the eclipse is at its maximum.

The principal phases occur as follows:

Moon enters penumbra.....Nov. 7, 1 <sup>h</sup> 34 <sup>m</sup> P. M. Pacific Time
Moon enters umbra.....Nov. 7, 2 58 P. M. Pacific Time
Middle of eclipse.....Nov. 7, 3 44 P. M. Pacific Time
Moon leaves umbra.....Nov. 7, 4 30 P. M. Pacific Time
Moon leaves penumbra.....Nov. 7, 5 55 P. M. Pacific Time

The third eclipse of the year is an *Annular Eclipse of the Sun* on November 27th. The path of the annulus runs from Texas thru the Gulf of Mexico, Cuba, nearly down to the north coast of South America, thence across the Atlantic into Africa, ending not far from Timbuktu. It may be seen as a partial eclipse thruout the greater part of North America and western Europe. The conditions governing the relative sizes of the Sun and Moon are reversed from those at the May eclipse; the Moon is in apogee, hence of smallest apparent size, and the Sun is nearly at its least distance from the Earth, hence nearly the greatest apparent size, and the Moon is too small to cover the whole disk at once.

The winter solstice, the time when the Sun reaches its greatest distance south of the equator, occurs December 22nd, 1<sup>h</sup>27<sup>m</sup> P. M. Pacific Time.

*Mercury* on November 1st is an evening star setting not quite an hour after sunset, therefore not in good position for observation. The apparent distance from the Sun increases and greatest east elongation occurs on November 12th. The planet then sets rather more than an hour after sunset; so that for a few days before and

after this date it may be seen in the evening twilight. After greatest east elongation the distance between planet and Sun diminishes rapidly, inferior conjunction being passed on December 2nd, the planet becoming a morning star, rapidly increasing its distance from the Sun. By the middle of the month the planet rises about an hour and three-quarters before sunrise and the interval does not fall below an hour and a half thru the rest of the month. Greatest west elongation is reached on December 21st. The last half of December is therefore an excellent time for observations in the morning twilight.

*Venus* is a morning star, rising nearly four hours before sunrise on November 1st. During the latter half of the month the interval is more than four hours. During December it slowly diminishes to about three and a half hours at the close of the month. Greatest west elongation occurs on November 23d. The planet passed its greatest brilliancy late in October but does not diminish greatly in brightness during the rest of the year. Its "stellar magnitude" diminishes from  $-4.3$  late in October to  $-3.7$  at the end of December, a loss of only half a magnitude. At its brightest it was more than fifty times as bright as the normal first magnitude star, and at the end of December it is still more than thirty times as bright.

*Mars* is still a morning star, gradually increasing its apparent distance from the Sun. On November 1st it rises a little before 2 A. M., and more than an hour earlier at the end of December. Its brightness is gradually increasing, being about twice as great in December as it was in June, and is a little fainter than the normal first magnitude star. It moves about  $30^\circ$  south and east from *Leo* into *Virgo* nearly on the line from *Regulus* to *Spica*.

*Jupiter* rises shortly before midnight on November 1st and at a little before 8 P. M. on December 31st. It is in the western part of *Leo* and moves slowly eastward about  $2^\circ$  up to December 5th. Its motion then reverses and during the rest of the year it moves about  $1^\circ$  westward.

*Saturn* is in the same quarter of the sky, rising about two hours later than *Jupiter*, at about 1:30 A. M. on November 1st, and at a little before 10 P. M. on December 31st. It is also in *Leo*, and moves about  $2^\circ$  east and south, being about  $12^\circ$  east and south of the principal star of the constellation *Regulus*. The apparent minor axis of the rings still continues to diminish, being only about one-twelfth of the major.

*Uranus* is well situated in the southwestern sky for evening observation, remaining above the horizon until after midnight on November 1st, and setting shortly before 9 P. M. on December 31st. It moves a little westward up to November 7th in the constellation *Aquarius*, then during the rest of the period it moves about  $1^\circ$  eastward. It is still in the neighborhood of the fourth magnitude star *Iota Aquarii* and early in December is about  $1^\circ 25'$  north of the star, being in almost the same position relative to the star as in early October.

*Neptune* remains in the constellation *Cancer* in the eastern sky in the evening, rising quite late.

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NOTE ON THE DOUBLE STAR, HUSSEY 321, = BURNHAM'S GENERAL CATALOGUE No. 8629

BY ERIC DOOLITTLE

This interesting, tho faint and wide, pair has the large motion in angle of more than  $1^\circ$  a year; the distance, also, has increased  $2''.3$  since its discovery twelve years ago. The complete measures to date are as follows:

1901.66	340°.1	4".41	9.3	11.1	Hussey 3 <sup>n</sup>	—0".02
1910.16	350°.3	5".63	9.3	11.1	Doolittle 3 <sup>n</sup>	+0.24
1910.53	351°.9	5".40	9.1	10.7	Abetti 4 <sup>n</sup>	—0.05
1912.66	352°.0	5".50	9.1	10.5	Fox 3 <sup>n</sup>	+0.01
1919.69	0°.0	6".68	9.4	10.3	Doolittle 5-3 <sup>n</sup>	—0.04

With so few observations a least squares reduction is not desirable; by the graphical method, however, we find (assuming the motion to be rectilinear)—motion of  $A=0''.144$  in  $212^\circ.2$ . The residuals in distance from this assumption are given in the above tabulation, and from these it will be seen that the observations are well represented. This is a large proper motion for so faint a star.

By the time this note can be published the star will be low in the west, but it should be occasionally observed when possible, as so large a motion in so faint a star is unusual. Its position for 1900.0 is R. A. =  $18^h 27^m 32^s$ ; Decl. =  $+23^\circ 5'.7$ .

The Flower Observatory,  
September 19, 1919.